

2025 RELEASE UNDER E.O. 14176

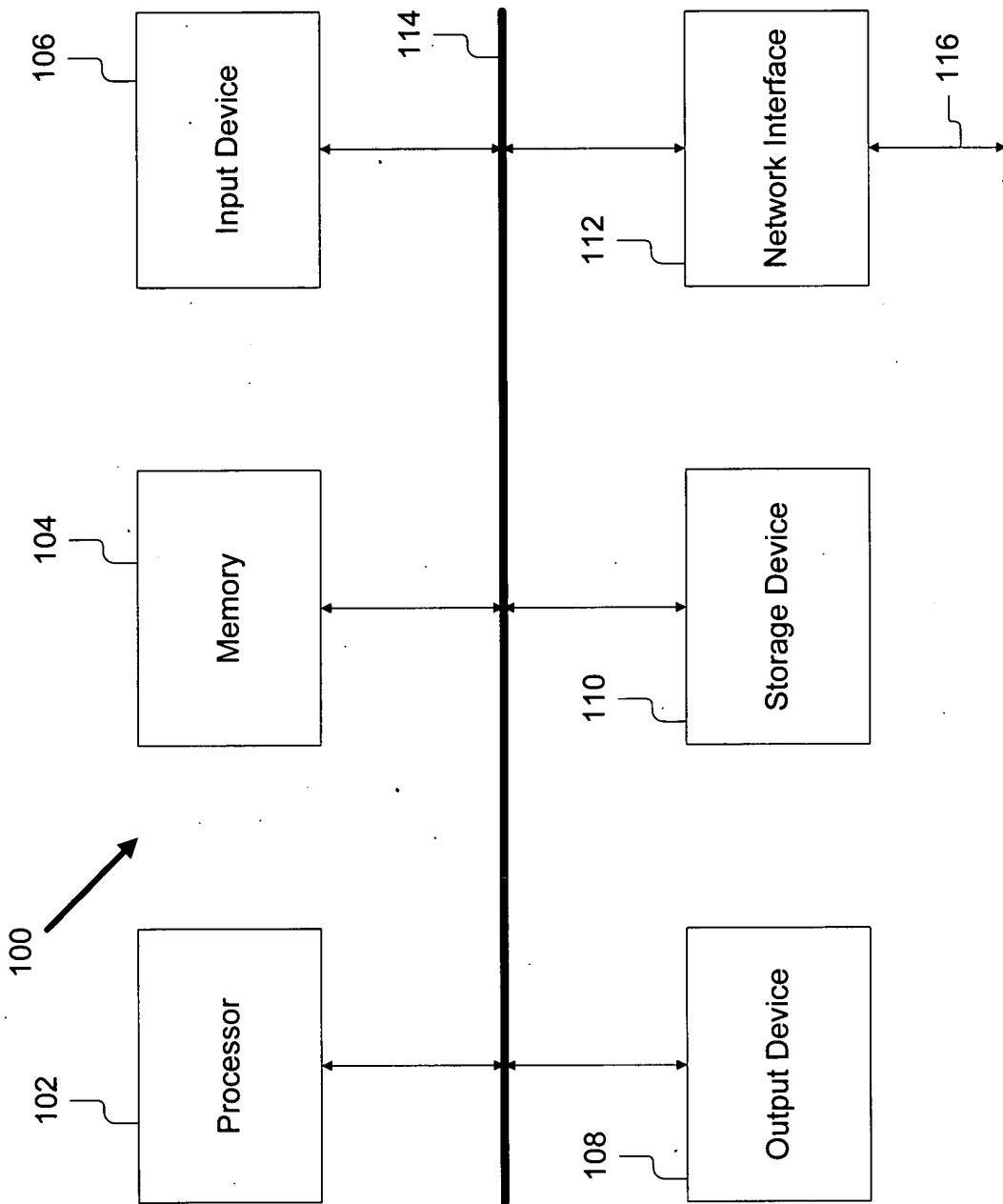


Figure 1

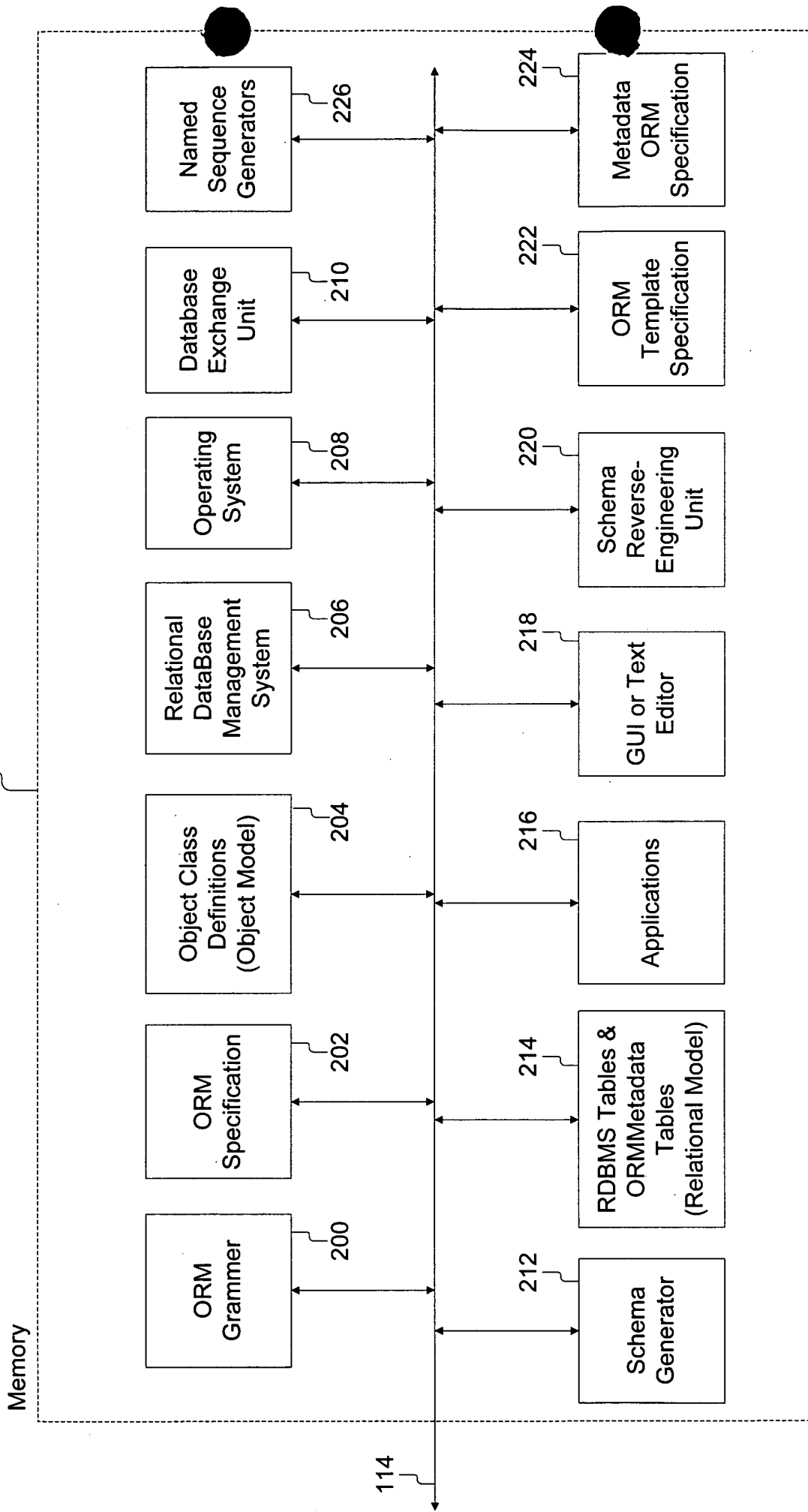


Figure 2

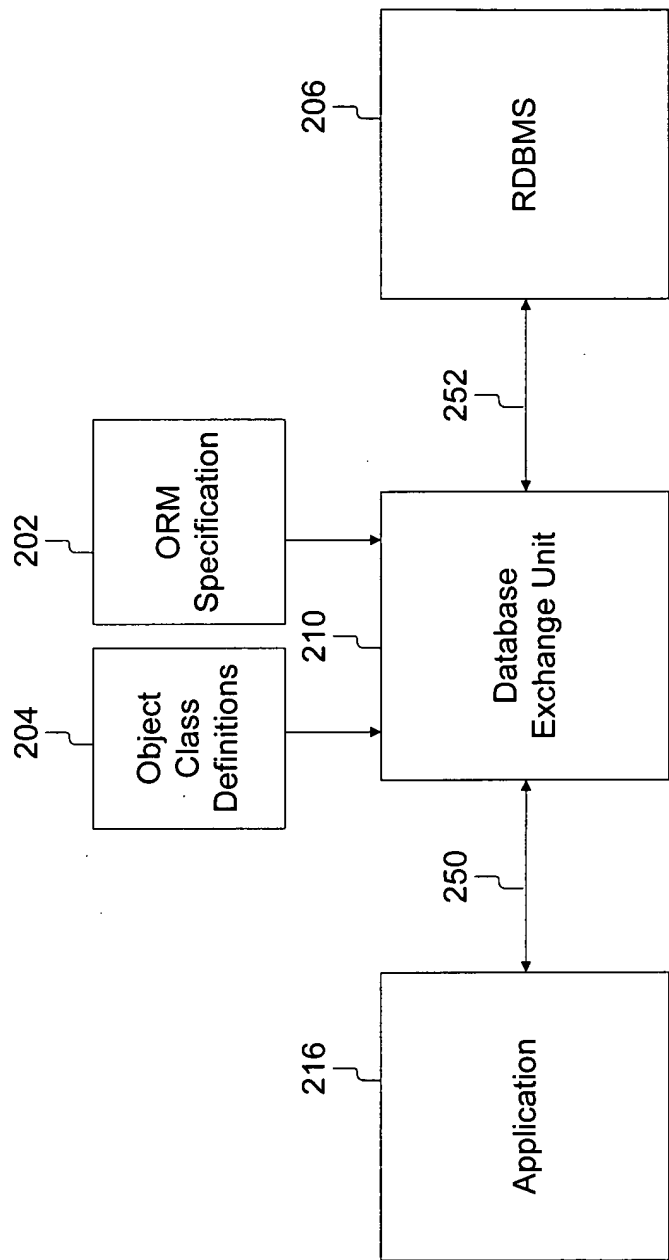


Figure 3

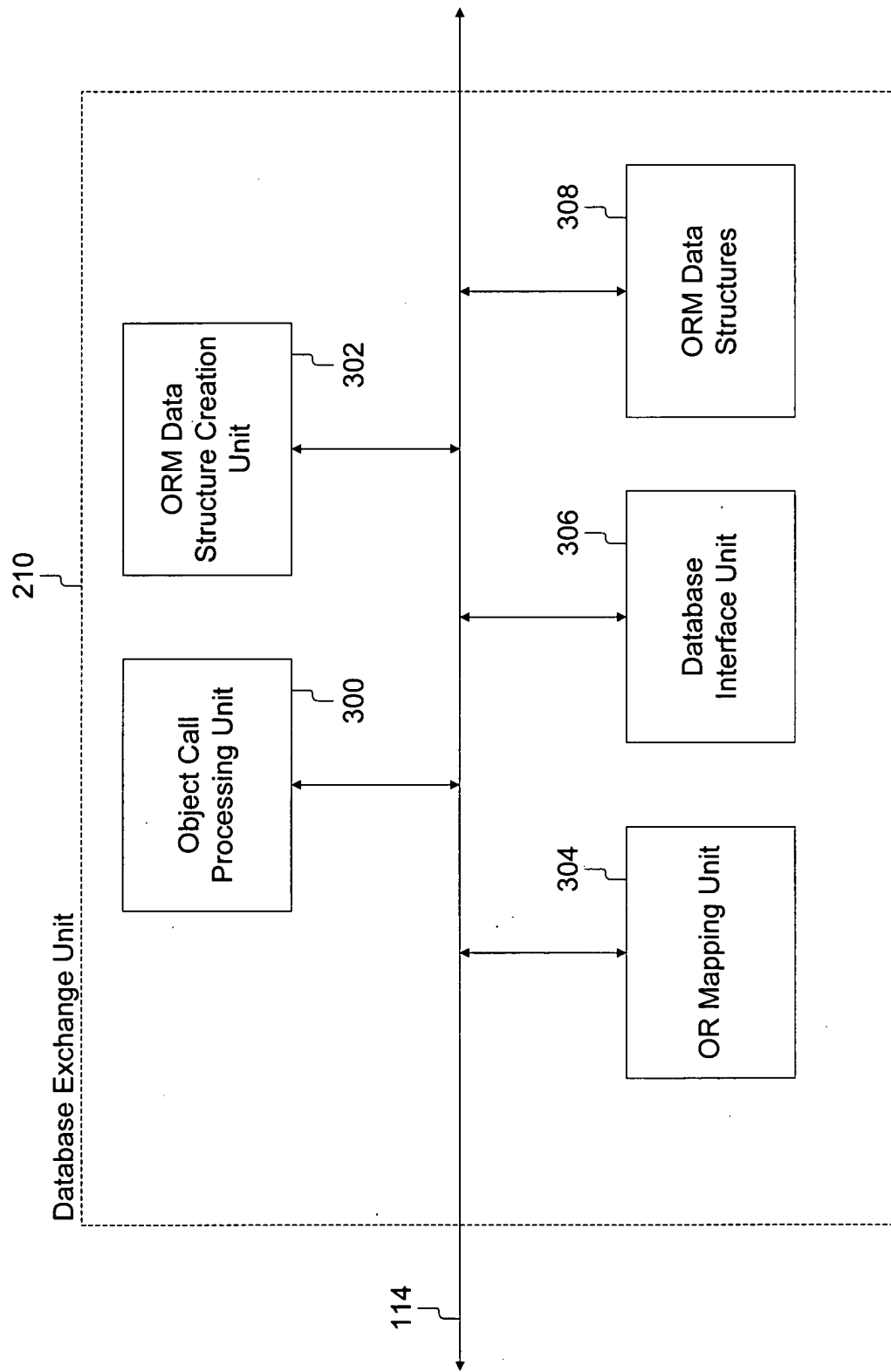


Figure 4

FIG. 5 is a block diagram of a database system.

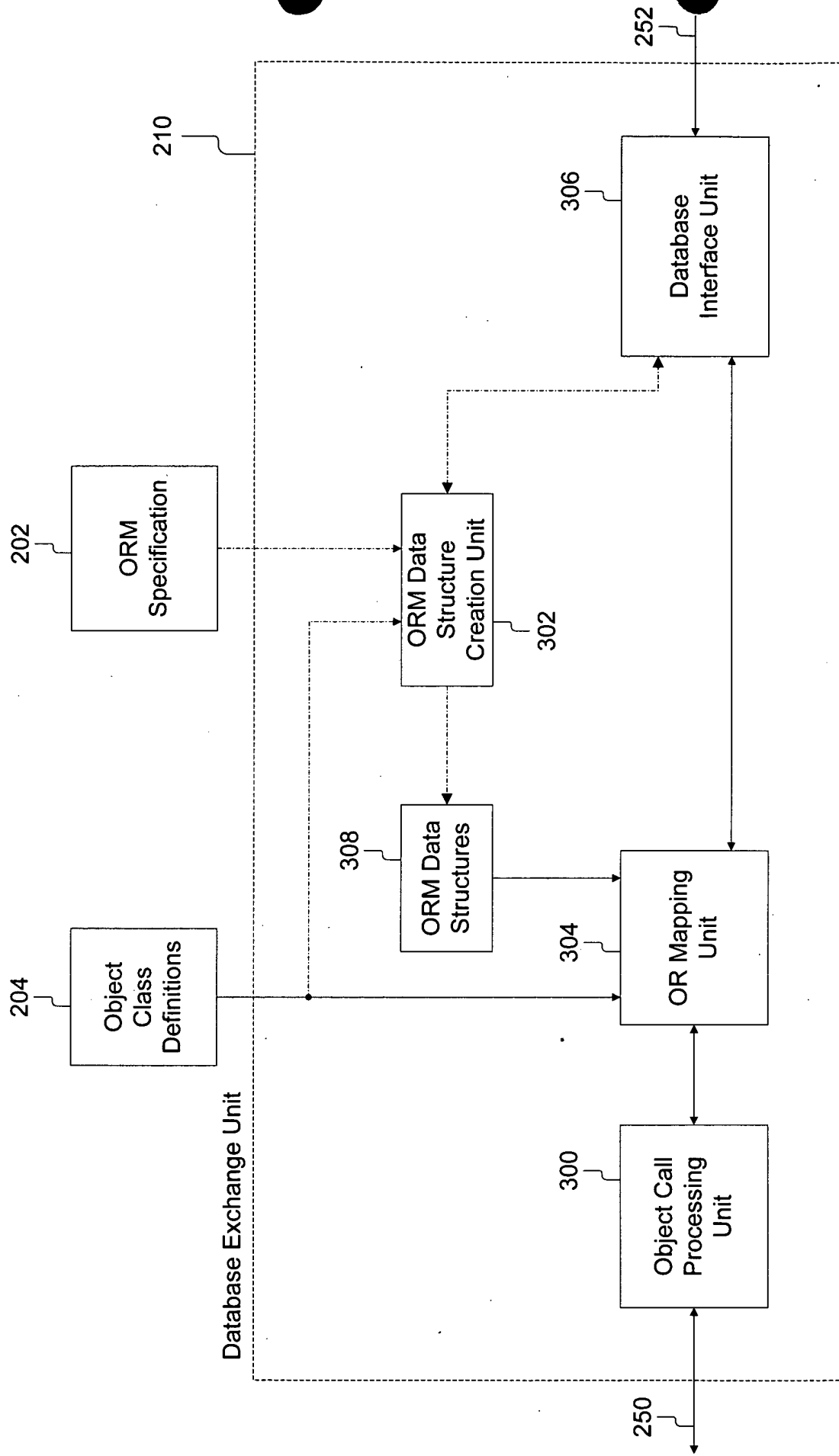


Figure 5

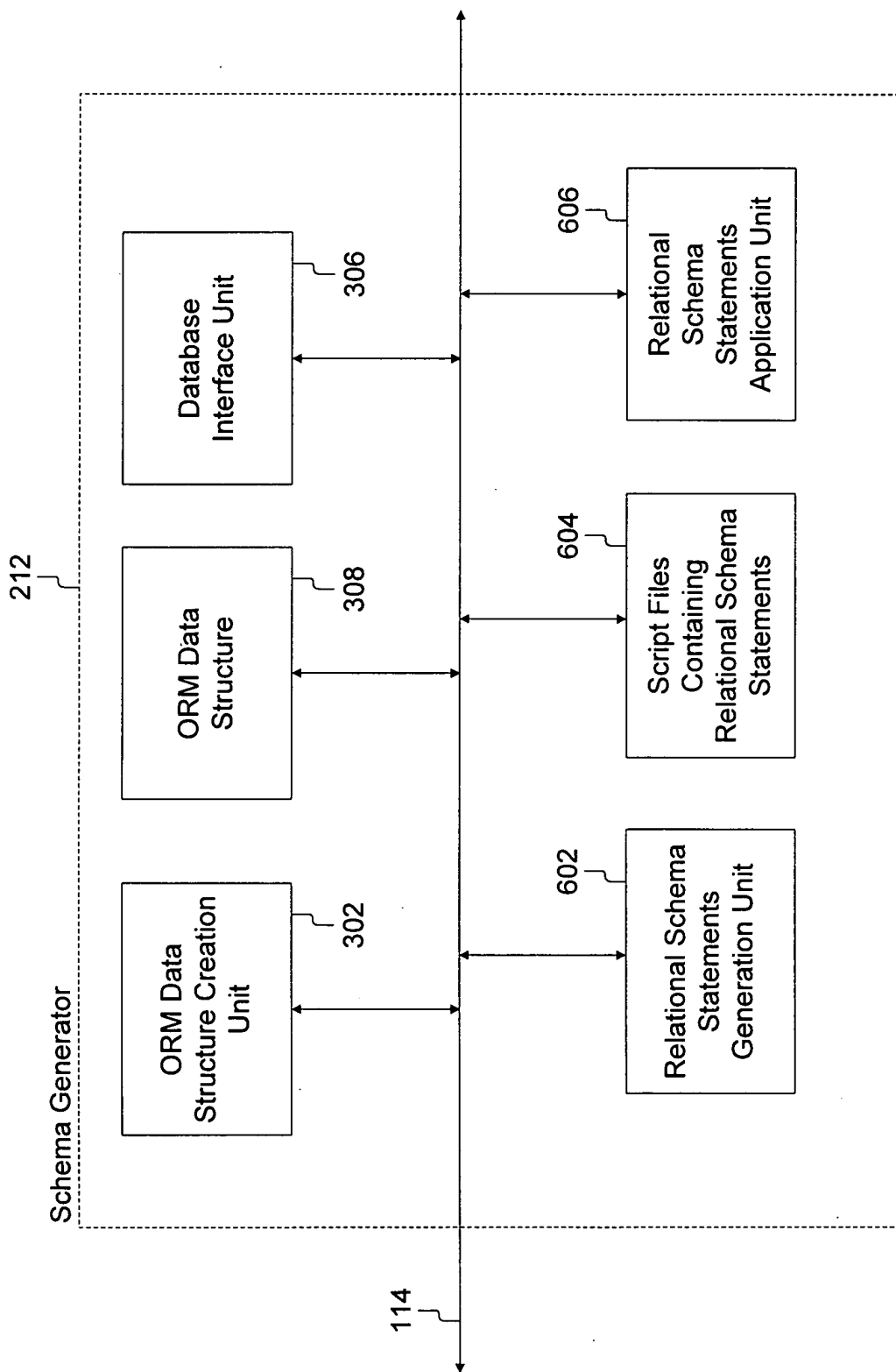


Figure 6

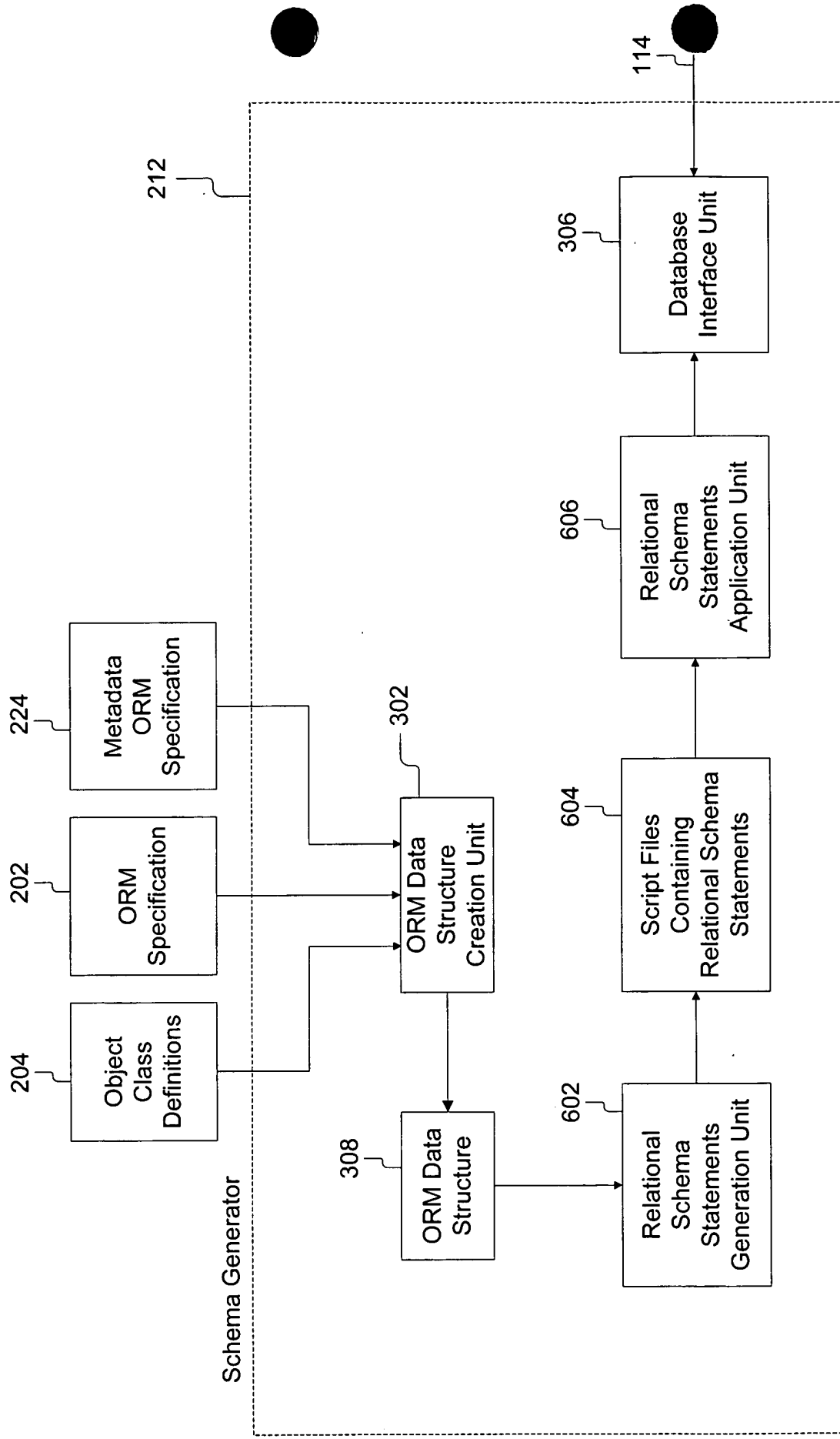


Figure 7

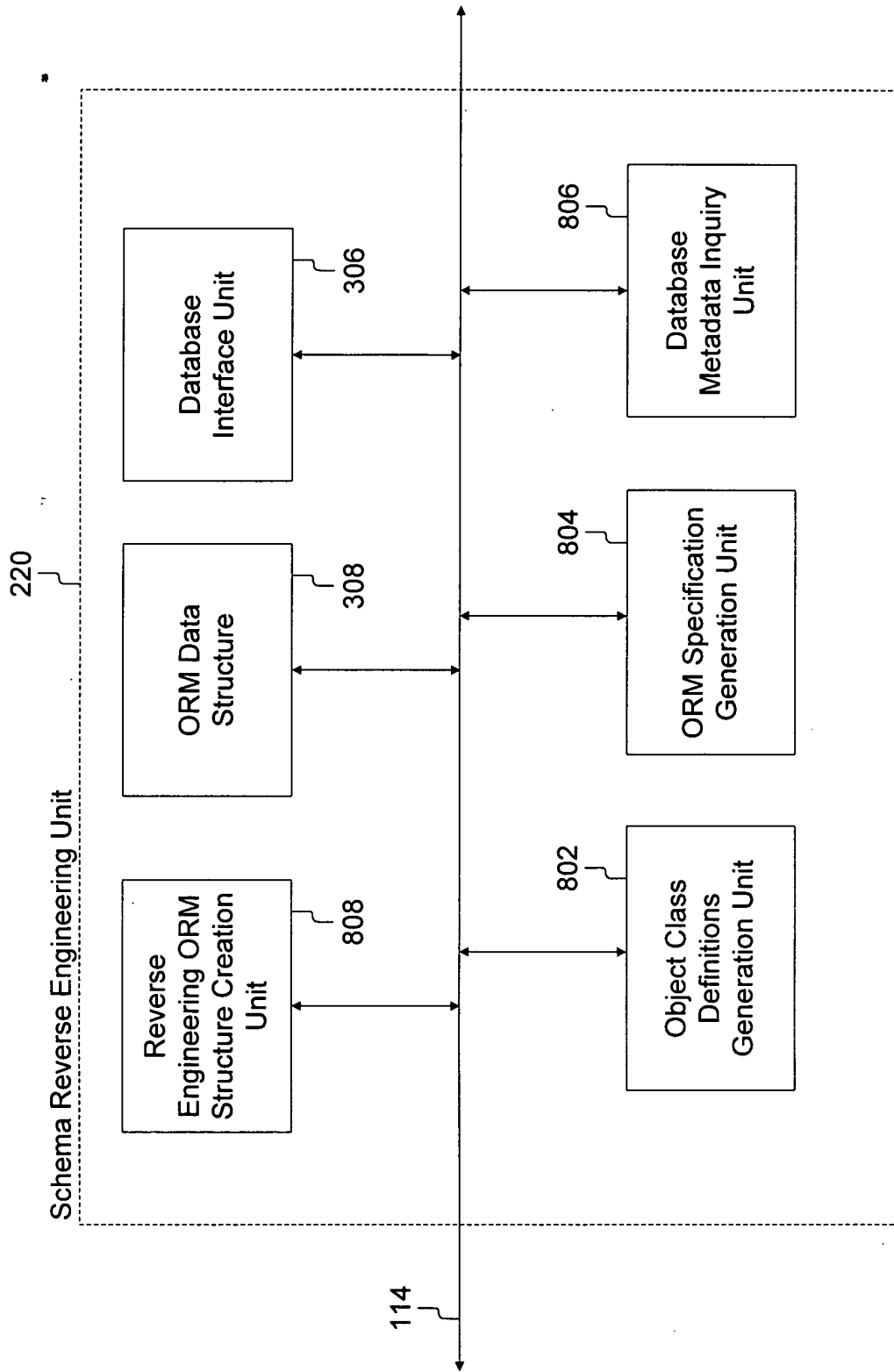


Figure 8

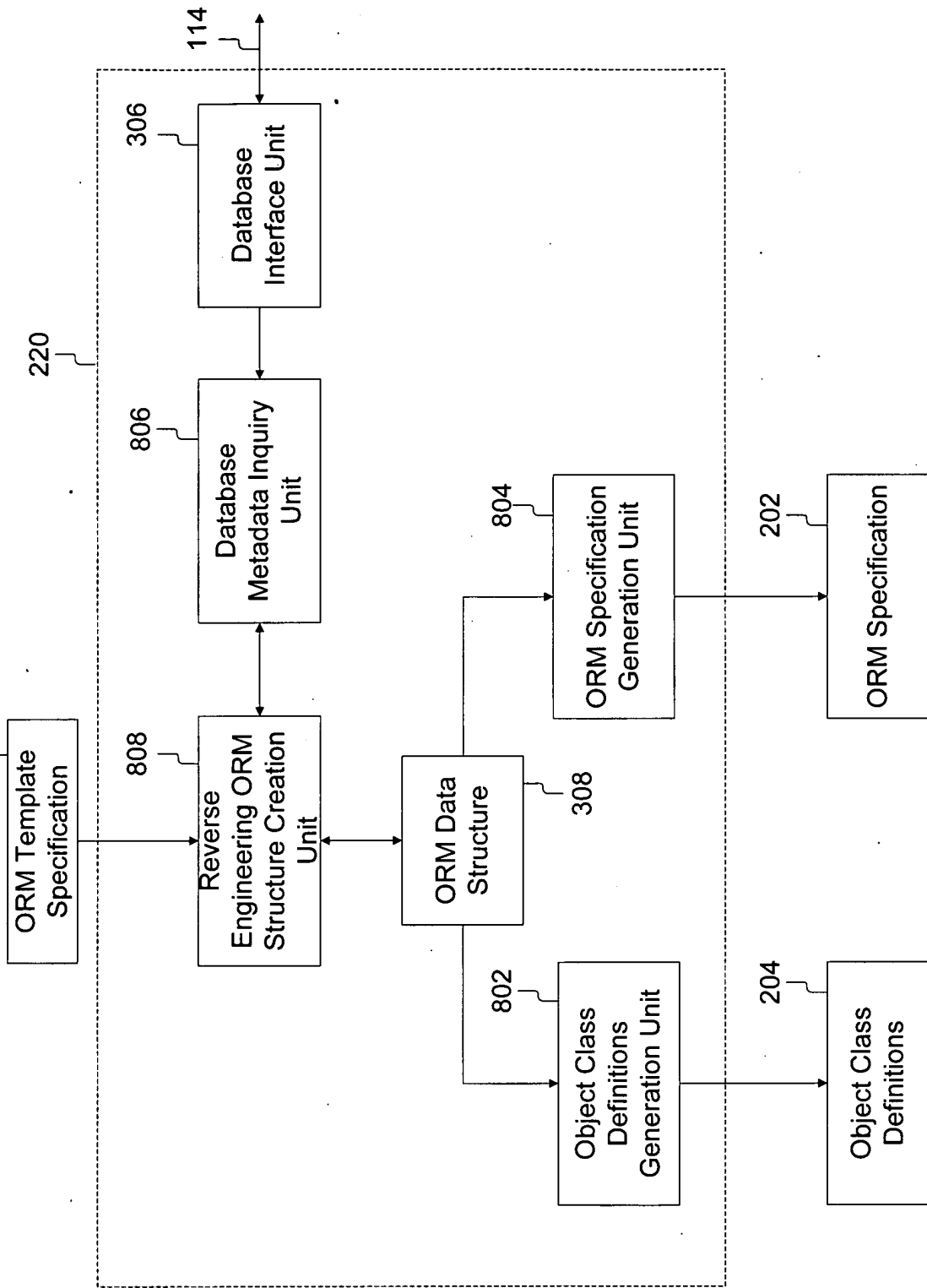


Figure 9

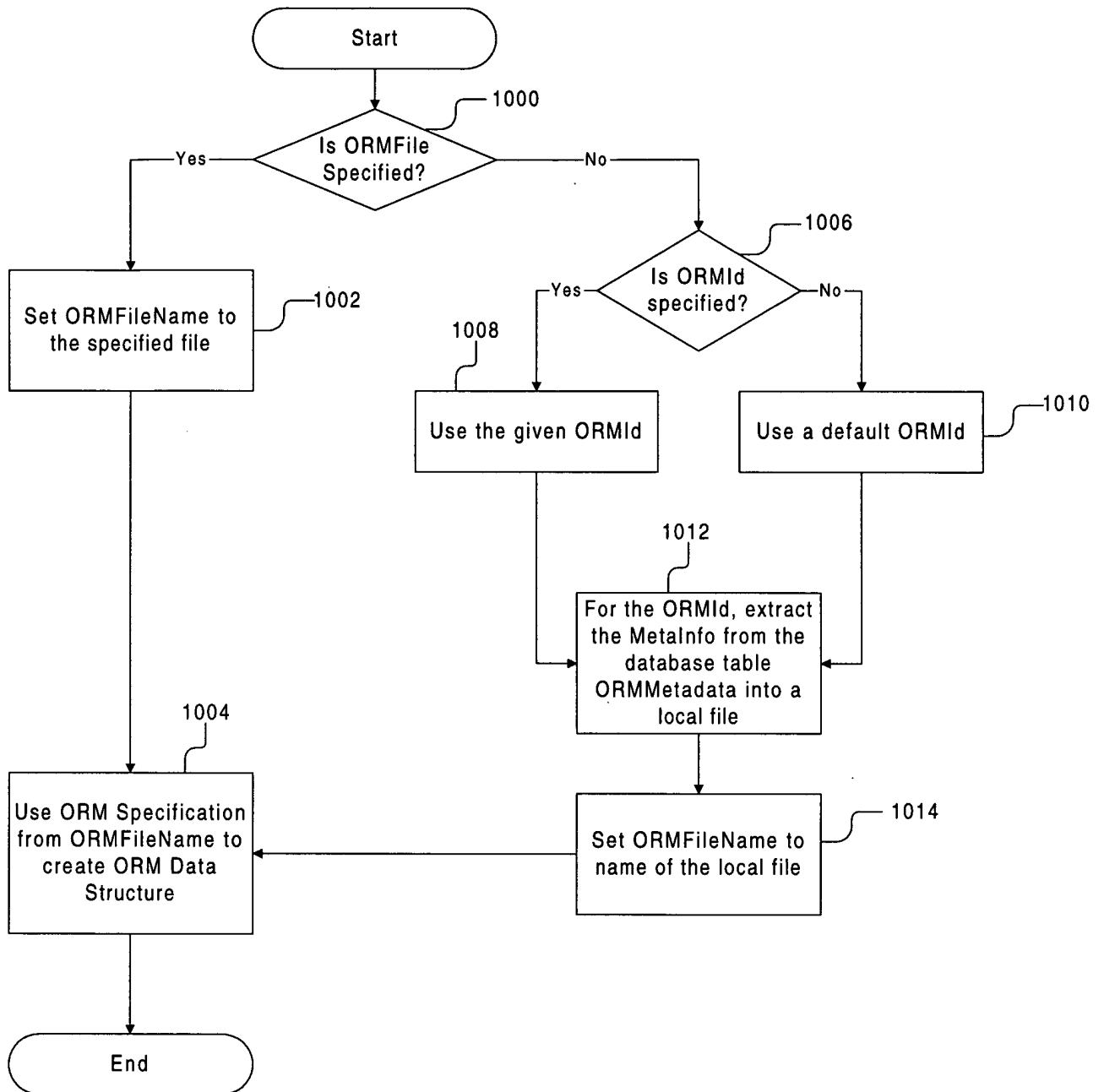


Figure 10

Method for using ORM specification based on an existing ORMid or an ORMfile to create an ORM Data Structure

Figure 11

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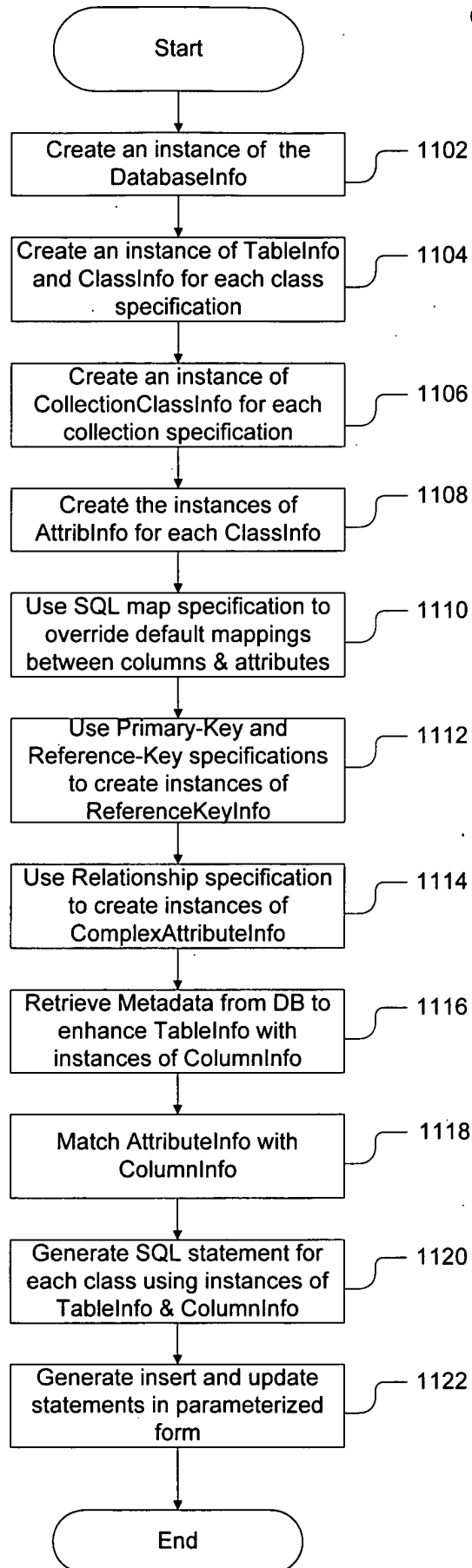
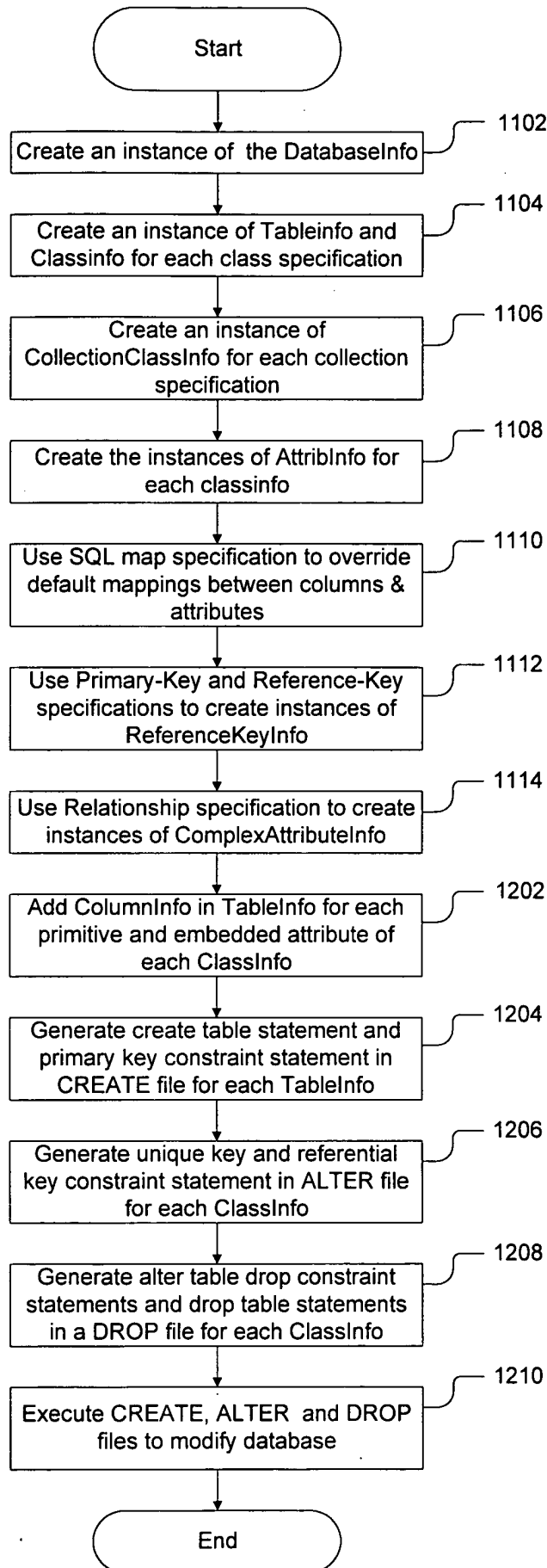


Figure 12



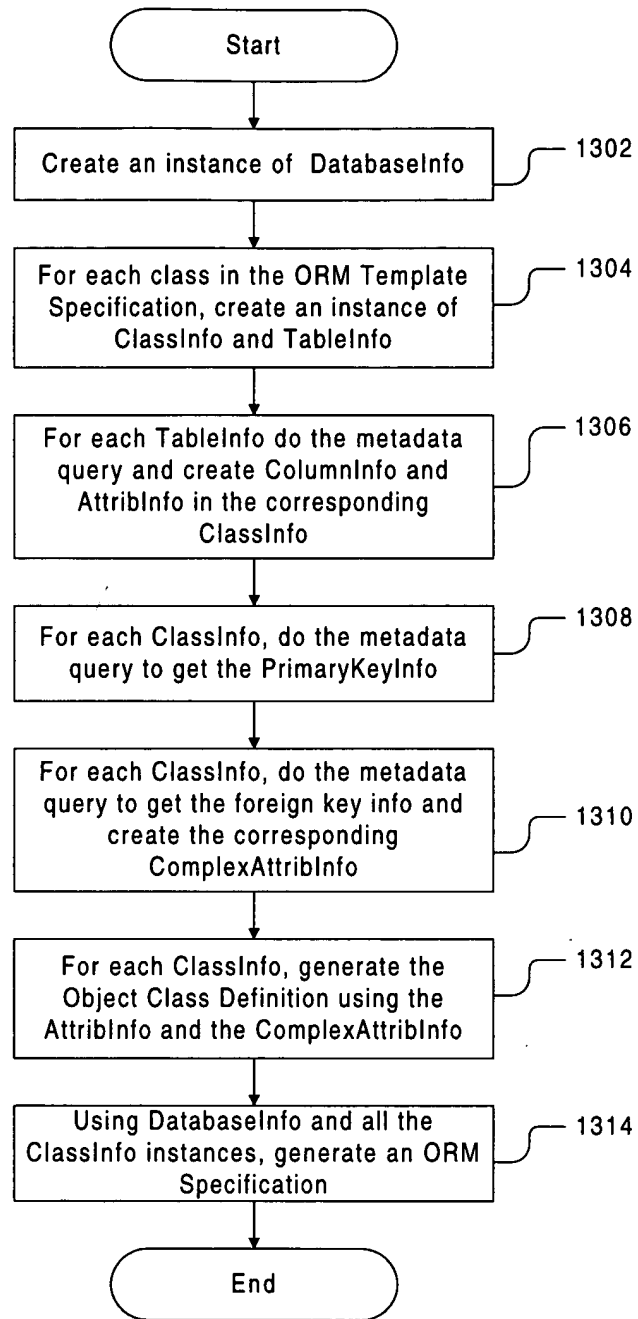


Figure 13

Method for generation of an ORM Specification and an Object Class Definition from a database schema

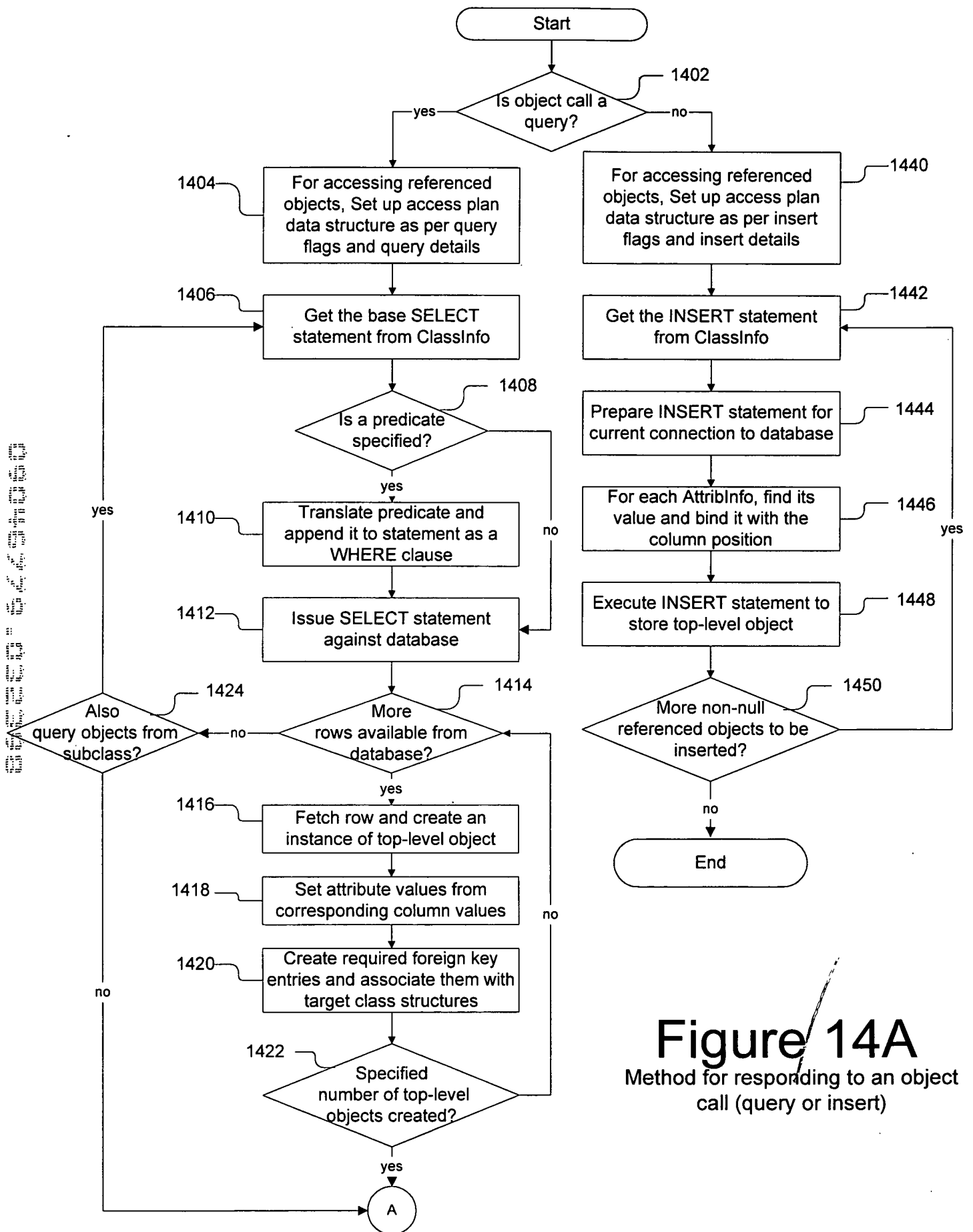


Figure 14A
Method for responding to an object call (query or insert)

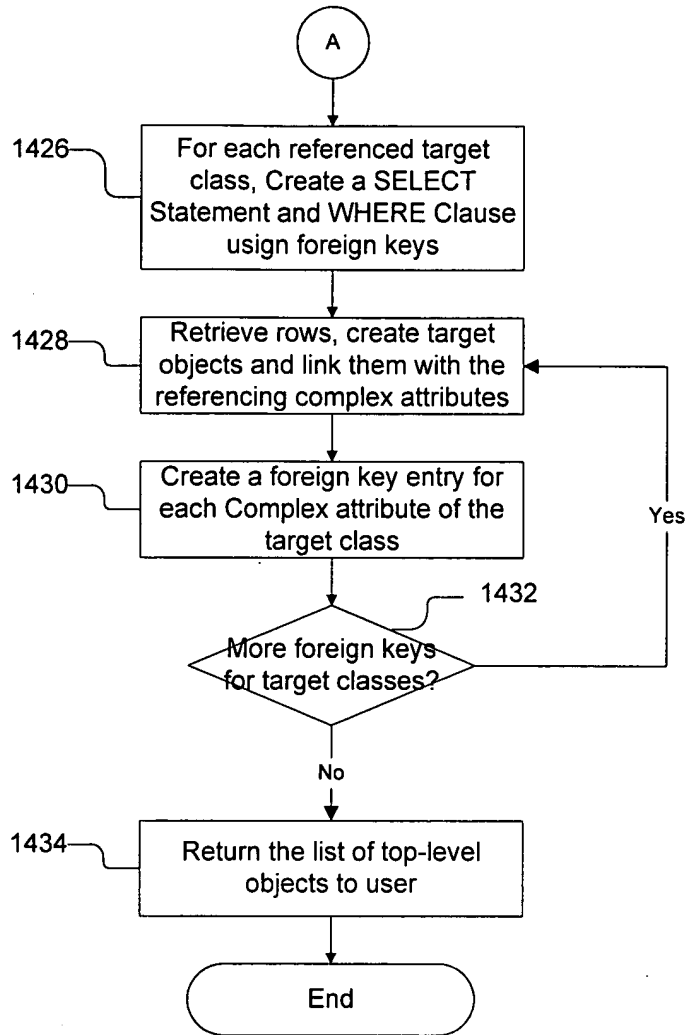
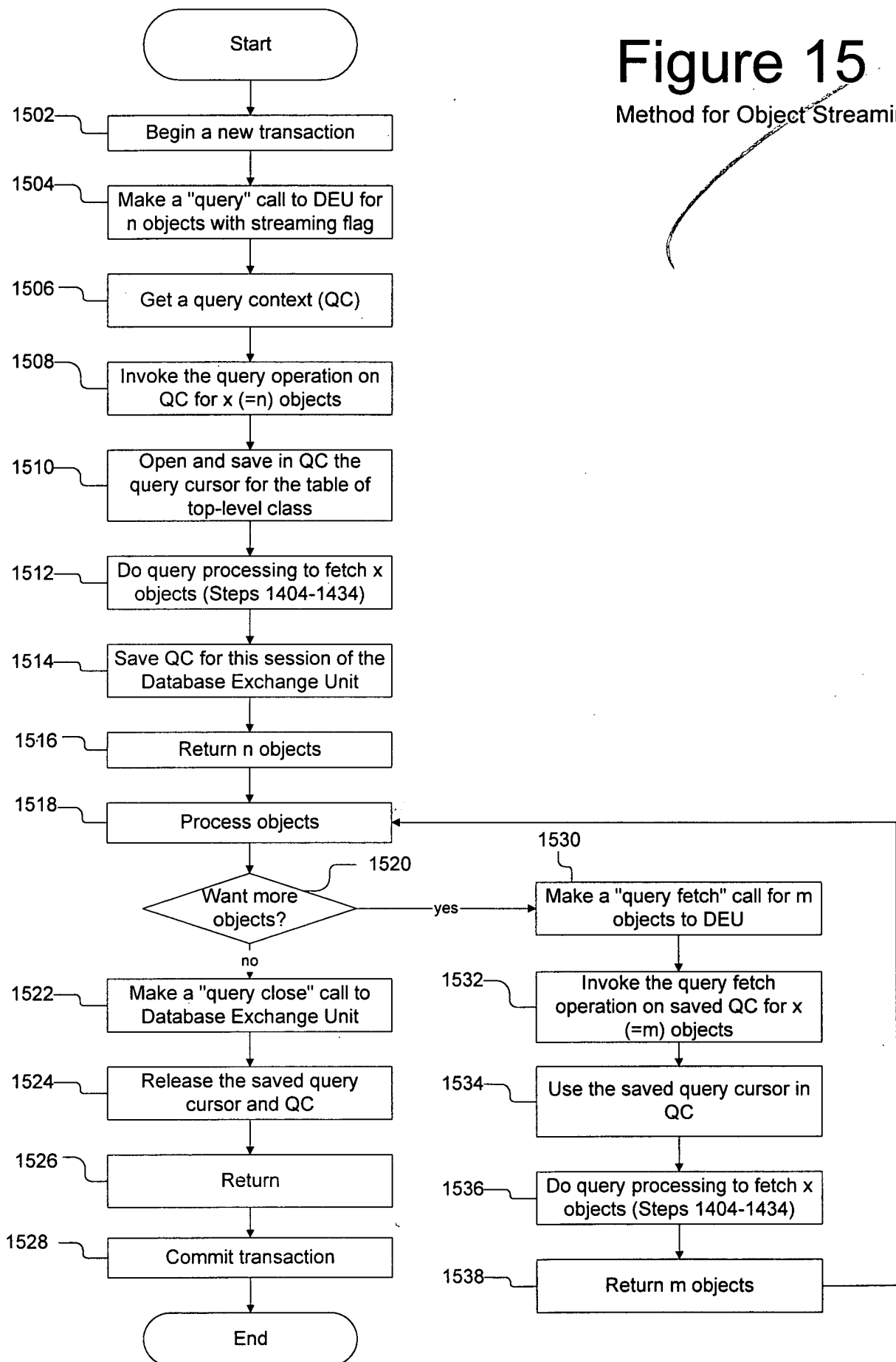


Figure 14B

Figure 15

Method for Object Streaming



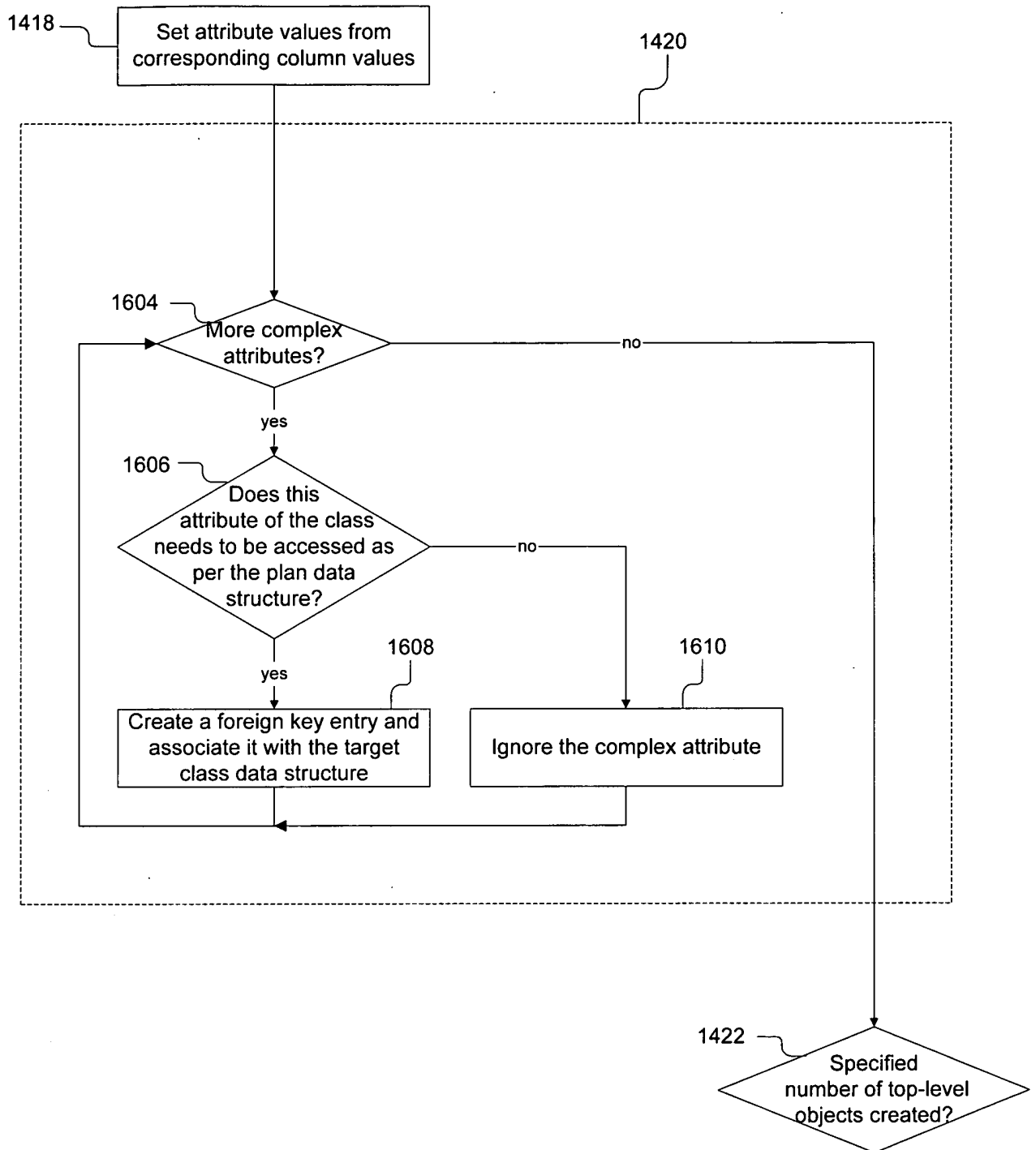


Figure 16
Method for Using Directed
Operations for a Query Operation

```

<ORM-INFO> ::= [;ORMId=<ORMId>] [;ORMFile=<fileName>]

<DATABASE-URL> ::= <regularURL> [<ORM-INFO>]

<ENDDATABASE-SPEC> ::= ;

<DATABASE-SPEC> ::= DATABASE <DATABASE-URL>
<ENDDATABASE-SPEC>

<PRIMARY-KEY-SPEC> ::= PRIMARY_KEY {<attribName> ...}

<REFERENCE-KEY-SPEC> ::= REFERENCE_KEY <referenceKeyName>
{<attribName> ...}

<SQLMAP-SPEC> ::= SQLMAP FOR <attribName>
[COLUMN_NAME <columnName>]
[SQLTYPE <sqlType>]
[NULLABLE]

<RELATIONSHIP-SPEC> ::= RELATIONSHIP <attribName> REFERENCES <targetClassName>
{EMBEDDED | [BYVALUE] [REFERENCED_KEY
<referencedKeyName>] WITH <attribName> ...}

<ENDCLASS-SPEC> ::= ;

<CLASS-SPEC> ::= CLASS <className> [TABLE <tableName>]
<PRIMARY-KEY-SPEC>
[<REFERENCE-KEY-SPEC> ...]
[<SQLMAP> ...]
[<RELATIONSHIP-SPEC> ...]
<ENDCLASS-SPEC>

<ORDERBY-SPEC> ::= ORDERBY {<attribName> ...}

<COLLECTION-CLASS-SPEC> ::= COLLECTION_CLASS <className>
COLLECTION_TYPE {ARRAY | VECTOR}
ELEMENT_CLASS <eleemtClassName>
[ELEMENT_TABLE <elementTableName>]
<PRIMARY-KEY-SPEC>
[<ORDERBY-SPEC>]
<ENDCLASS-SPEC>

<SEQUENCE-SPEC> ::= SEQUENCE <sequenceName>
MAX_INCREMENT <maxIncrementValue>
[START_WITH <startingVal>]

<ORM-SPEC> ::= <DATABASE-SPEC>
Any combination of <CLASS-SPEC>,
<COLLECTION-CLASS-SPEC>,
<SEQUENCE-SPEC> and <REMARK-SPEC>

```

FIGURE 17
ORM Grammar

```

DATABASE jdbc:odbc:sqlpubs;user=guest;password=hello;ORMId=pubs01
;
REM
CLASS RoySched TABLE roysched
PRIMARY_KEY title_id lorange
;
COLLECTION_CLASS ArrayRoySched COLLECTION_TYPE ARRAY
ELEMENT_CLASS RoySched
PRIMARY_KEY title_id
ORDERBY royalty
;
CLASS Title TABLE titles
PRIMARY_KEY title_id
RELATIONSHIP royscheds REFERENCES ArrayRoySched BYVALUE WITH
title_id
SQLMAP FOR price SQLTYPE Money
;
COLLECTION_CLASS ArrayTitle COLLECTION_TYPE ARRAY ELEMENT_CLASS
Title
PRIMARY_KEY pub_id
ORDERBY ytd_sales title_id
;
CLASS PubInfo TABLE pub_info
PRIMARY_KEY pub_id
SQLMAP FOR logo SQLTYPE image
SQLMAP FOR prInfo COLUMN_NAME pr_info SQLTYPE text
;
CLASS Publisher TABLE publishers
PRIMARY_KEY pub_id
RELATIONSHIP pubInfo REFERENCES PubInfo BYVALUE WITH pub_id
RELATIONSHIP titles REFERENCES ArrayTitle BYVALUE WITH pub_id
;
CLASS Job TABLE jobs
PRIMARY_KEY job_id
;
CLASS Emp TABLE employee
PRIMARY_KEY emp_id
RELATIONSHIP job REFERENCES Job REFERENCED_KEY PrimaryKey WITH
job_id
RELATIONSHIP publisher REFERENCES Publisher WITH pub_id
;
CLASS TitlePub
PRIMARY_KEY title_id
;
CLASS LinkList TABLE linklist
PRIMARY_KEY link_id
RELATIONSHIP next REFERENCES LinkList BYVALUE WITH next_link_id
;

```

FIGURE 18
ORM Specification

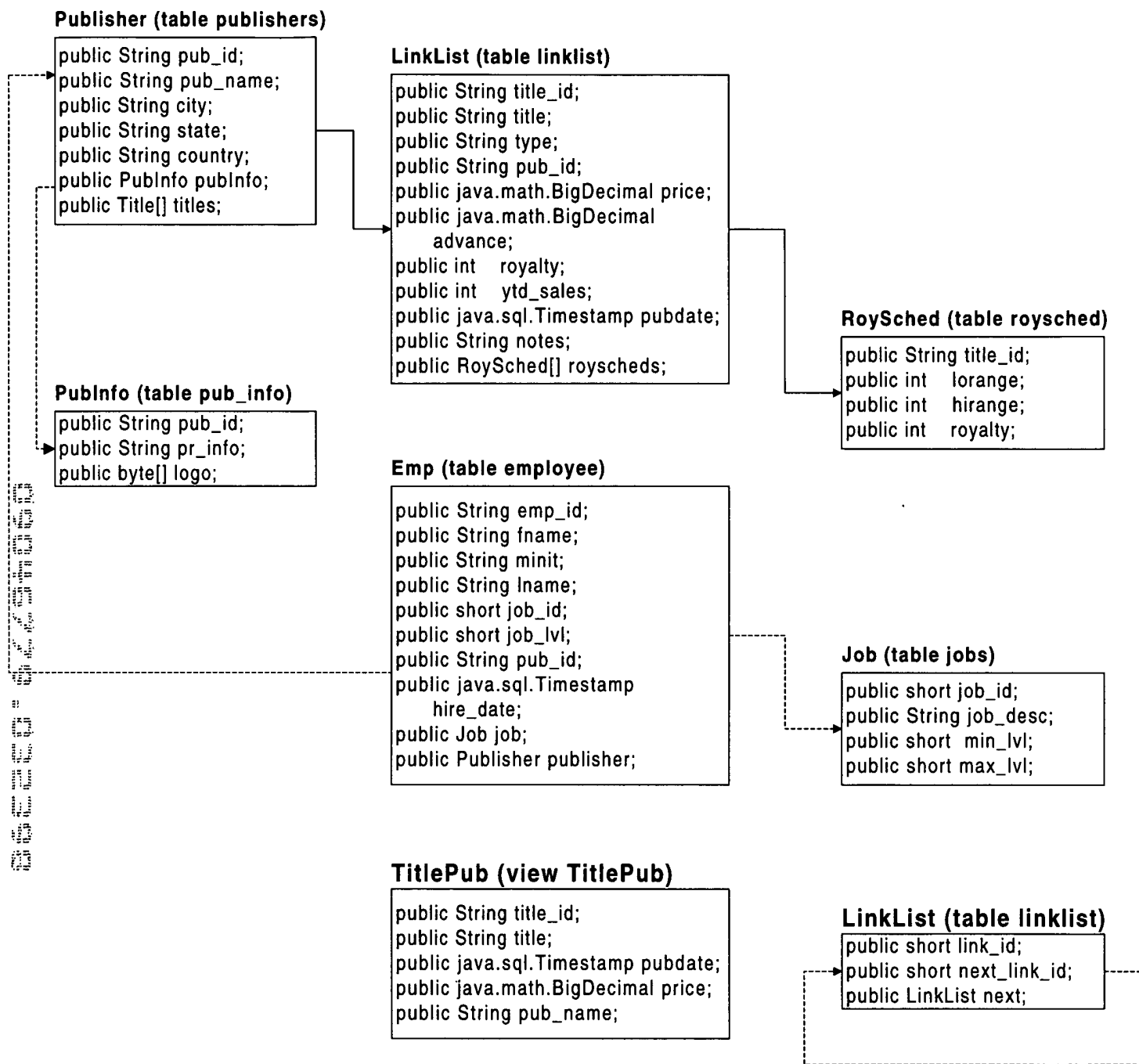


Figure 19

ORM Spec Graphical rep

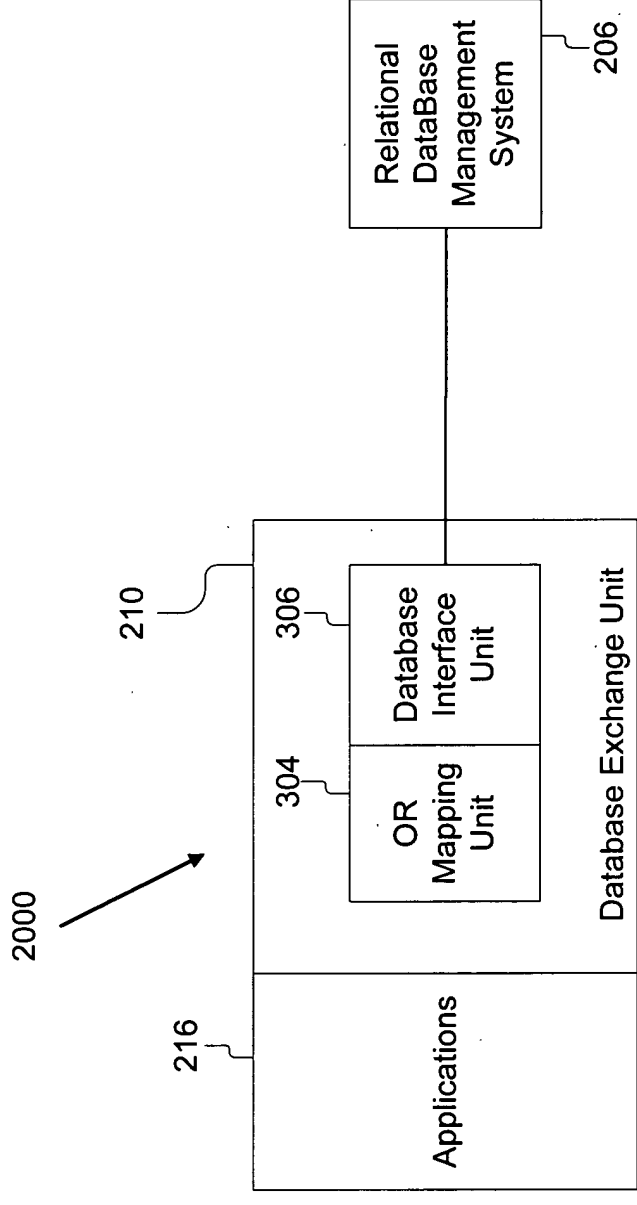


Figure 20A

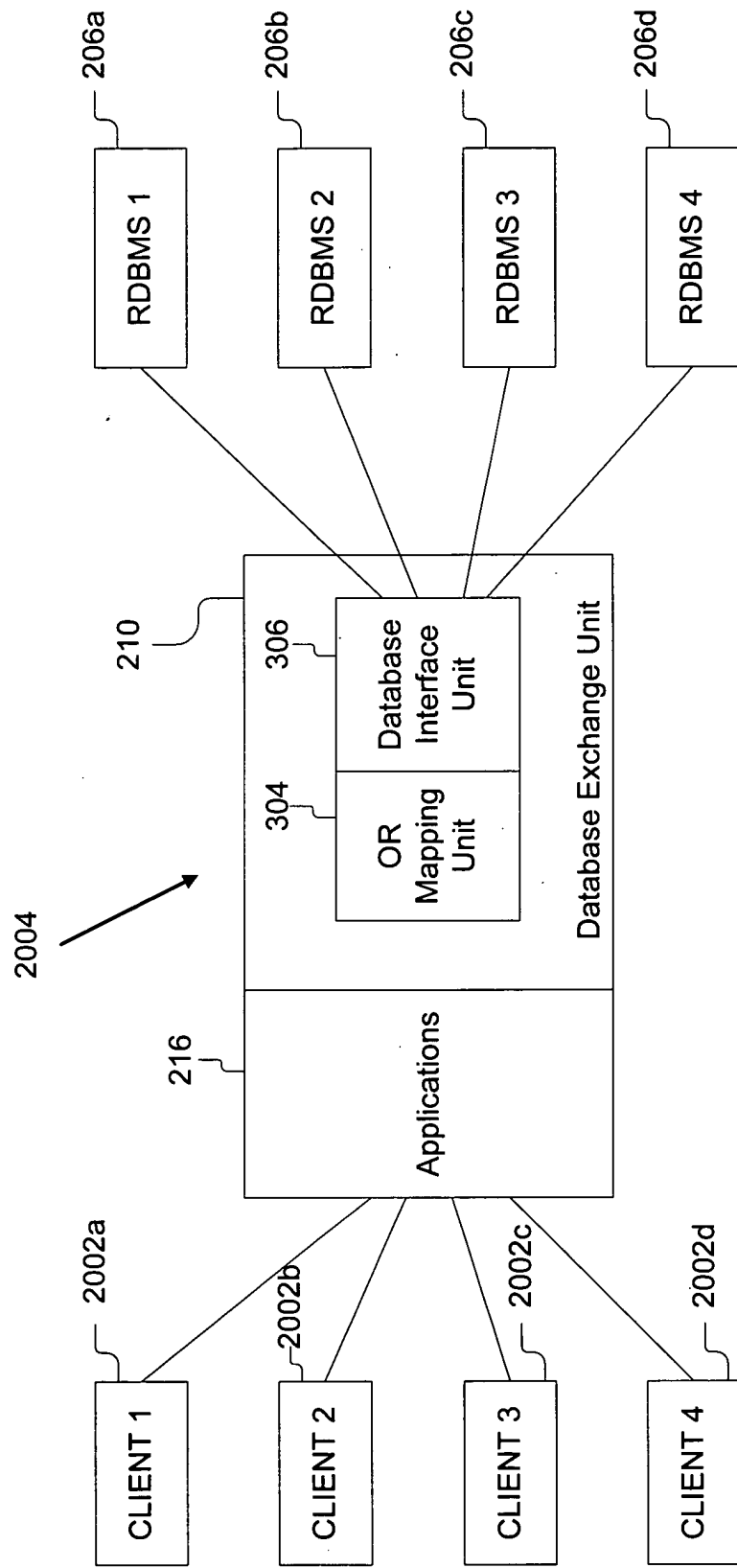


Figure 20B

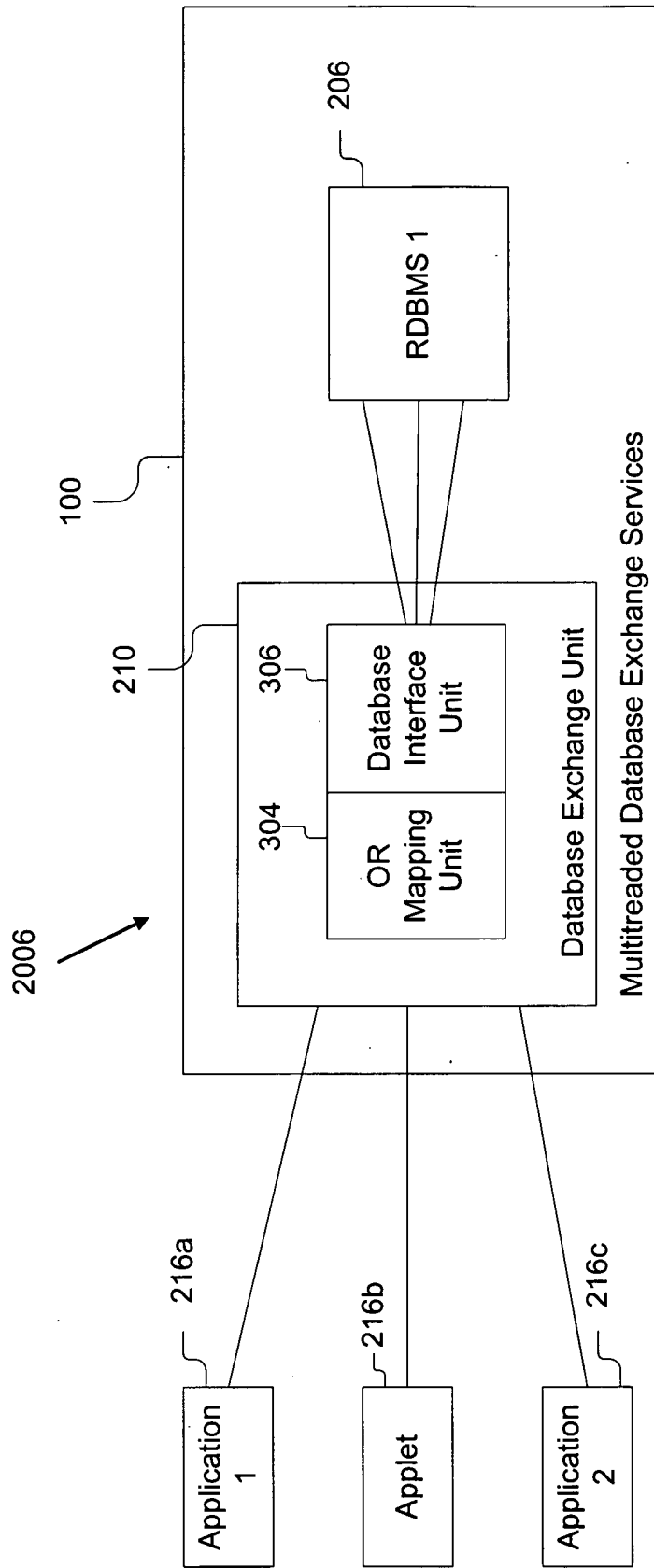


Figure 20C

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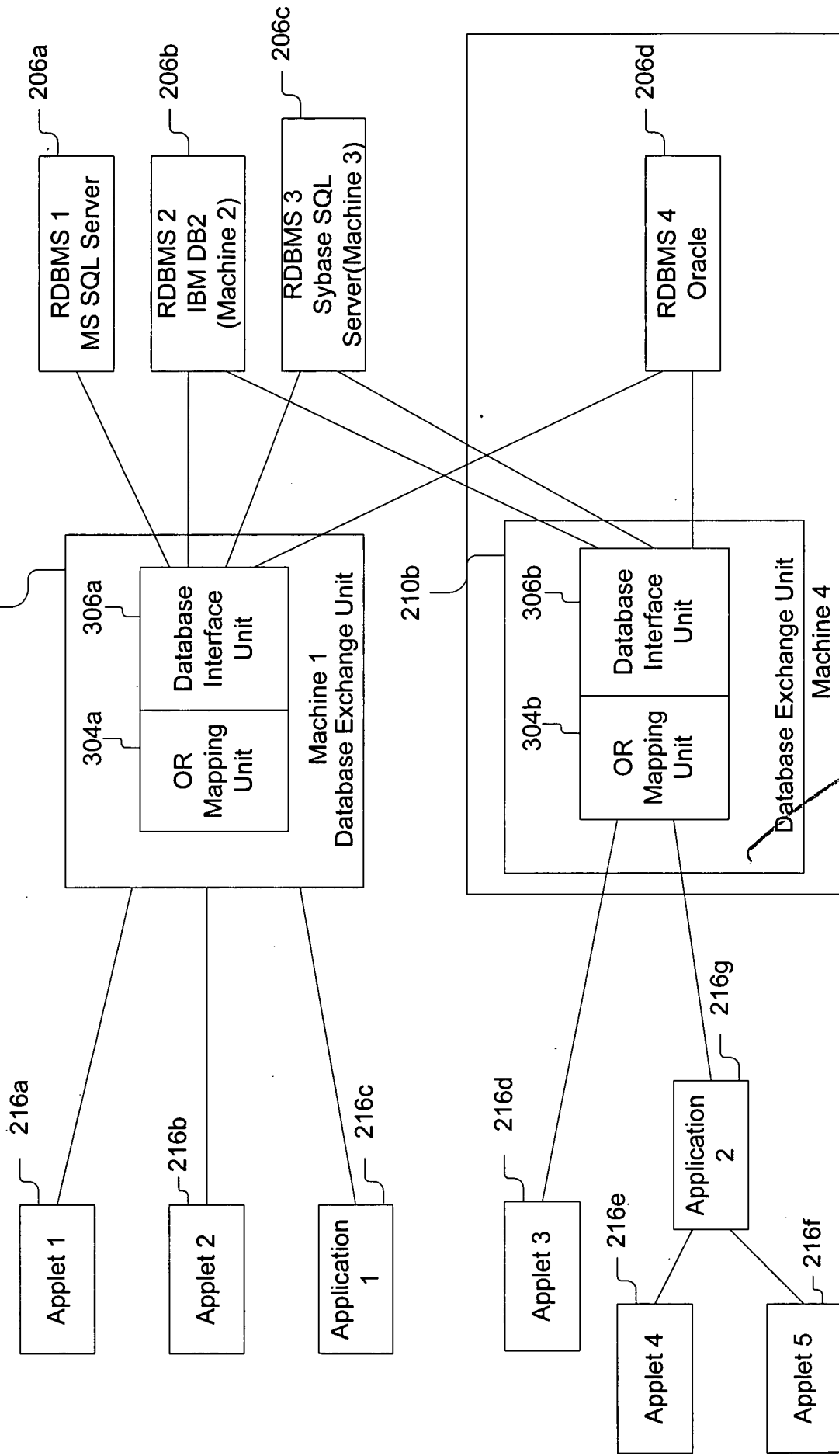


Figure 20D

FIGURE 21A

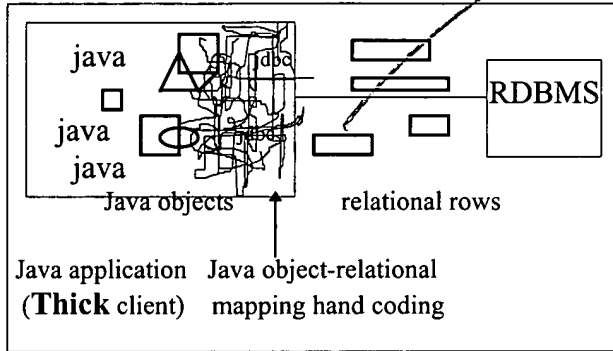
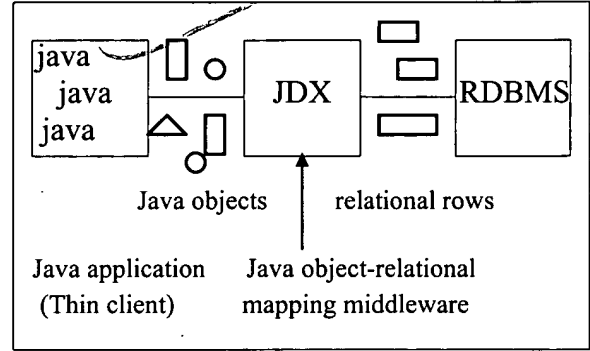


FIGURE 21B



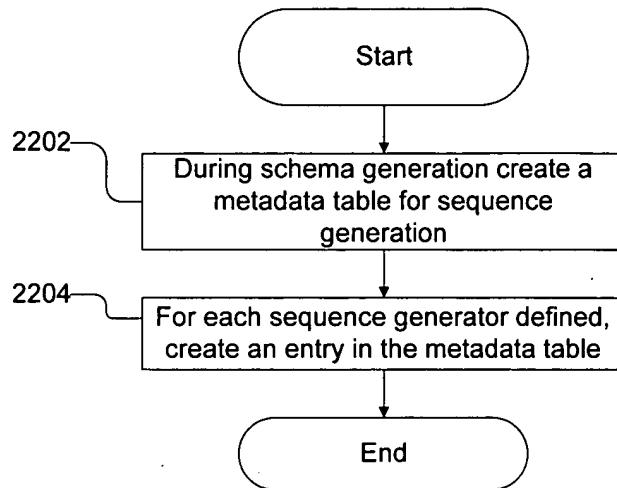


Figure 22A

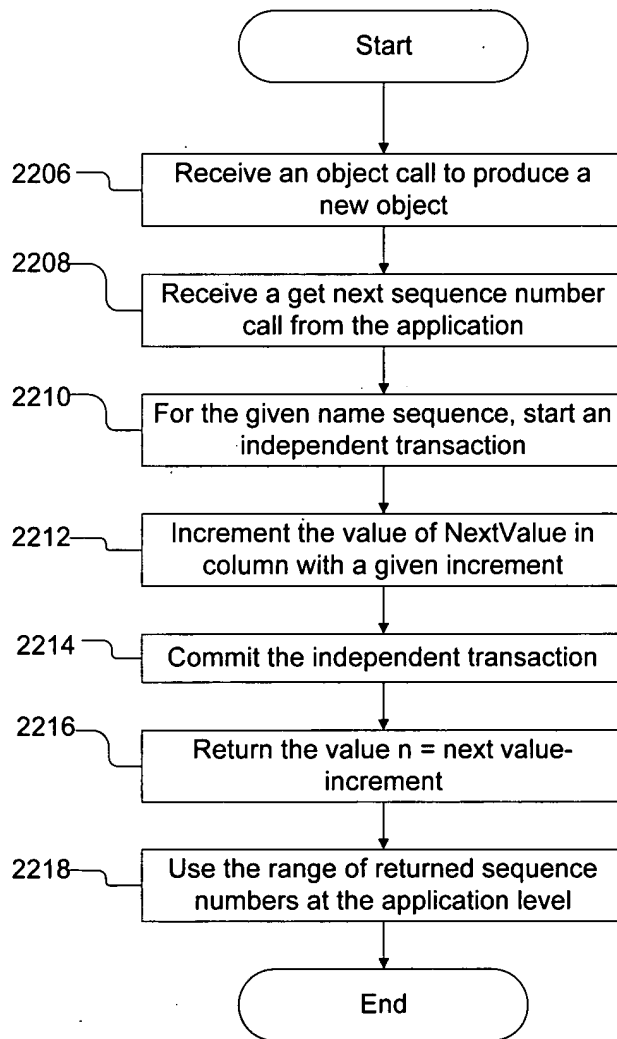


Figure 22B

Method for Generating and using
Named Sequence Generators